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PROCEEDINGS

OF THE

ROYAL SOCIETY OF EDINBURGH.

1837–38. No. 12.

55TH SESSION. FIRST ORDINARY MEETING.

Monday, *4th December* 1837.

SIR T. M. BRISBANE, Bart., President, in the Chair.

The following Communications were read :—

1. On the Food of the Herring and Salmon. By John Stark, Esq.

The author of this paper, after some preliminary observations, arranged his remarks under the following heads :—1. On the food and sex of the Vendace of Lochmaben. 2. On the food of the Herring (*Clupea Harengus*, Lin.) And, 3, On the food of the Salmon (*Salmo salar*, Lin.)

1. As to the food of the Vendace (*Coregonus Lavaretus*, Fleming), he observed, that fishes in lakes, and feeding on animal food, must necessarily subsist on the small aquatic animals found in these lakes: That there is no reasonable analogy between the vendace and the herring, because they live in different mediums, the one in salt, the other in fresh water; and that their food cannot, therefore, be the same, none of the animals upon which fishes feed being common to both: That, besides, they are of different natural families: That writers on natural history state the animalcules which are found in the stomach of the vendace, and the other minute animals found

in lakes, to form the food of fresh-water fishes generally; and that Leeuwenhoeck had even figured the identical animal found in the stomach of the vendace in 1833 more than 130 years before, stating that it and the other minute animals in similar localities, formed the food of the larger fishes.

Regarding the sexes of the vendace, the author did not consider the necessity of a male parent required to be proved.

2. *Food of the Herring.*—The author stated, that the food of the herring was known and described from personal examination by Neucrantz, previous to the year 1654; by Leeuwenhoeck in 1696; by Fabricius in 1781; by Müller in 1785; by Bloch about the same period; by Lacepede and Latreille in 1798; by the Rev. Dr Scoresby in 1820; by Pennant and others; and, in fact, is mentioned by every writer who treats of the natural history of fishes: And that what has been stated by all authors on the subject of the herring's food, is corroborated by the examination of the stomach and intestinal canal of that fish, and by the specimens on the table of the Society.

3. *Food and Reproduction of the Salmon.*—The author stated on this head, what had been remarked by the most esteemed authors on natural history to form the food of the salmon; and exhibited preparations by Dr Parnell, confirming the statements of these writers. He next noticed the valuable evidence taken before a Committee of Parliament in 1824 and 1825, regarding the food and natural history of the salmon, which also corroborated the statements of systematic writers; and remarked, that when these fishes prey upon animals in roe, the ova often remain in the stomach and intestinal canal, when the other portions of the food are wholly digested. He next gave an abstract of the evidence before the Parliamentary Committee, as to the periods of the ascent of the salmon in the different rivers for the purpose of spawning, and the descent of the fry to the sea; and pointed out the experiments made on the development of the ova by Mr John Hogarth junior, as detailed in the appendix to the Report of the Committee,—and those made by Mr Schonberg, and recorded in Sir David Brewster's Journal of Science.

2. Dr Barry made some verbal remarks on the Physiology of the *Proteus Anguinus.*

The following Gentlemen were elected Fellows of the Society :

1. J. Stuart Menteath, Esq.
2. John Clark, M.D., K.H.

The following Donations were presented :

Bulletin de la Société Géologique de France. Tome vii. Feuilles 20–23 ; and Tome viii. Feuilles 1–20.—*Par la Société.*

Memoires de la Société Geologique de France. Tome ii. Parts 1, 2. —*Par la Société.*

Flora Batava, Nos. 80, 95, 96, 97, 98, 99, 109, and 111.—*By the King of Holland.*

On the Results of Experiments made on the Weight, Height, and Strength, of above 800 Individuals. By Professor Forbes.

On the Muscular Effort required to ascend Planes of different Inclinations. By Professor Forbes.

Note relative to the supposed Origin of the deficient Rays in the Solar Spectrum ; being an account of an Experiment made at Edinburgh during the Annular Eclipse of 15th May 1836. By Professor Forbes.

On the Temperatures and Geological Relations of certain Hot Springs, particularly those of the Pyrenees ; and on the Verification of Thermometers. By Professor Forbes.

By the Author.

Biographical Sketch of the late Edward Turner, M.D., Professor of Chemistry in University College, London. By Robert Christison, M.D., Professor of Materia Medica in the University of Edinburgh, &c.—*By the Author.*

The American Journal of Science and Arts. Conducted by Benjamin Silliman, M.D., LL.D. For October 1833, January 1835, and January and July 1837.—*By the Editor.*

The Journal of the Asiatic Society of Bengal for November and December 1836, January, February, April and May 1837.

First Part of the Nineteenth Volume of Asiatic Researches, or Transactions of the Society instituted in Bengal for inquiring into the History, the Antiquities, the Arts and Sciences, and Literature of Asia. *By the Society.*

The Anatomy, Particular and Surgical, of the Human Body, illustrated by a series of Engravings ; by A. Fyfe, F.R.C.S.E. Corrected and arranged, and with explanatory letter-press, by P. D. Handyside, M.D., F.R.S.E. Part 2.—*By Dr Handyside.*

The Quarterly Journal of Agriculture; and the Prize-Essays and Transactions of the Highland and Agricultural Society of Scotland. Nos. xxxvii, xxxviii, and xxxix.—*By the Highland and Agricultural Society.*

Investigation of the Equation to Fresnel's Wave Surface. By Archibald Smith, Esq., Trinity College, Cambridge.—*By the Author.*

Account of the Andersonian Museum, Glasgow.—*By James Smith, Esq. of Jordanhill.*

Memoirs, chiefly Anatomical and Physiological. By Robert Knox, M.D., F.R.S.E.—*By the Author.*

Astronomische Nachrichten, Nos. 323 to 336.—*By Professor Schumacher.*

The Fourth Annual Report of the Royal Cornwall Polytechnic Society, 1836.—*By the Society.*

Nieuwe Verhandelingen der Eerste Klasse van het Koninklijk-Nederlandsche Instituut van Wetenschappen, Letterkunde en Schoone Kunsten, te Amsterdam. Tomes 1, 2, 3, 4, 5.—*By the Institute.*

Naturkuundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem. Deels 13 to 23.—*By the Dutch Society of Sciences at Haarlem.*

Histoire des Maladies observées à la Grande Armée Francaise, pendant les Campagnes de Russie en 1812, et d'Allemagne en 1813. Par le Chevalier J. R. L. De Kerckhove dit De Kirckhoff.—*By the Author.*

Transactions of the Philosophical and Literary Society of Leeds. Vol. i. Part 1.—*By the Society.*

Annalen der Physik und Chemie. Herausgegeben zu Berlin, von J. C. Poggendorff. 1836, Nos. 2, 7, 8, 9. 1837, Nos. 1, 2, 3, 4, 5.—*By the Editor.*

Natuur-en Scheikundig Archief, uitgegeven door G. J. Mulder en W. Wenckebach. 1836. Stuk 4.—*By the Editors.*

Tijdschrift voor Natuurlijke Gescheidenis en Physiologie. Uitgegeven door J. Van Der Hoeven, M.D., en W. H. De Vriese, M.D. Vol. iii. Part 3.—*By the Editors.*

Transactions of the American Philosophical Society held at Philadelphia for promoting Useful Knowledge. Vol. v., and vol. vi.

Part 1; and of the New Series, Vol. i. and Vol. iii. Parts 1 and 3.—*By the Society.*

Recueil de Voyages et de Memoires, publié par la Société de Geographie. Tome v.—*By the Society.*

Neue Wirbelthiere zu der Fauna von Abyssinien gehorig, entdeckt und beschrieben von Dr Eduard Rüppell. Lieferungs 7, 8, 9. —*By the Author.*

The Ancient Kalendars and Inventories of the Treasury of his Majesty's Exchequer, together with other documents illustrating the History of that Repository. Collected and edited by Sir Francis Palgrave, K.H. 3 vols.

Proceedings and Ordinances of the Privy Council of England. Edited by Sir Harris Nicolas. Vols. vi. and vii.

Excerpta è Rotulis Finium in Turri Londinensi asservatis, Henrico Tertio Rege. A. D. 1246-1272, curâ Caroli Robert. Vol. ii.
By the Commissioners on the Public Records.

Nova Acta Physico-Medica Academiæ Cæsareæ Leopoldino-Carolinæ Naturæ Curiosorum. Vol. xvi., and vol. xvii. part 2.—*By the Academy.*

Uebersicht der Säugthiere, Vogel, Amphibien und Fische Schlesiens von Dr C. L. Gloger.

Das Abandern der Vogel durch Einfluss des Klima's von Dr C. L. Gloger. *By the Author.*

Disquisitionum de Avibus ab Aristotele commemoratis Specimen I. Scripsit C. L. Gloger.—*By the Author.*

Bulletin de la Société Imperiale des Naturalistes de Moscow. 1837. Nos. 1, 2, 3, 4.—*By the Society.*

Library Catalogue and Regulations of the Telford Premiums of the Institution of Civil Engineers.—*By the Institution.*

Charter and Bye-Laws of the Institute of British Architects of London.—*By the Institute.*

Transactions of the Statistical Society of London. Vol. i. part 1. —*By the Society.*

Notice of two Roman Inscriptions relative to the Conquest of Britain by the Emperor Claudius Cæsar. By John Hogg, Esq. A. M., Fellow of St Peter's College, Cambridge.—*By the Author.*

Etudes des Gîtes Houillers et Metallifères du Bocage Vendéen faite en 1834 et 1835. Par Henri Fournel, Ingenieur des Mines.

Atlas au Meme. *Par M. le Duc de Cazes.*

Memorias da Academia R. das Sciencias de Lisboa. Tomo xii. parta 1.—*By the Society.*

Elements of Chemistry, by the late Edward Turner, M. D. Sixth edition. Enlarged and revised by Professor Liebig and Wilton G. Turner. Part 1.—*By the Editors.*

The Madras Journal of Literature and Science for October 1836 and January 1837.—*By the Madras Literary Society.*

Observations upon a " Report by the Select Committee on Salmon Fisheries, Scotland: together with the Minutes of Evidence, Appendix and Index." 30th June 1836. By Robert Knox, F.R.S.E.—*By the Author.*

Proceedings of the Geological Society of London. Nos. 48, 49, 50, 51.—*By the Society.*

Stellarum Duplicium et Multiplicium Mensuræ Micrometricæ per magnum Fraunhoferi Tubum annis a 1824 ad 1837 in Specula Dorpatensi institutæ, adjecta est Synopsis observationum de Stellis compositis Dorpati annis 1814 ad 1824 per minora instrumenta perfectarum, Auctore F. G. W. Struve.—*By the Author.*

Mesures Micrometriques obtenues à l'Observatoire de Dorpat avec la Grande Lunette de Fraunhofer de 1824 à 1837. Par F. G. G. Struve.—*By the Author.*

Memoires de l'Academie Imperiale des Sciences de Saint Petersbourg. (Sciences Mathematiques, &c.) Tome i. livr. 4.

Do. do. (Sciences Naturelles.) Tome ii. livr. 3.

Do. do. (Sciences Politiques, &c.) Tome iii. livr. 6, and tome iv. livr. 2.

Recueil des Actes de la Seance publique de l'Académie Imperiale des Sciences de Saint Petersbourg, tenue le 30 Decembre 1836. *Par l'Academie Imperiale.*

Systematic Treatise on Zoology. By Professor Jarotski of Warsaw. 5 vols.—*By Prof. Johnston of Durham.*

Observations on the Influence of Climate on Health and Mortality. By Arthur Saunder Thomson, M. D.—*By the Author.*

Principal Documents relating to the Survey of the Coast of the United States; and the construction of uniform Standards of Weights and Measures for the Custom-Houses and States. By F. R. Hassler. 3 Parts.—*By the Author.*

Commentatio de Definienda Quantitate Vaporis Aquei in Atmosphæra vel Aëre quocunque. Auctore A. C. G. Suerman.

Dissertatio Physica Inauguralis de Calore Fluidorum Elasticorum specifico. Auctore A. C. G. Suerman.

Specimen Inaugurale de Fractionibus Continuis. Auctore P. O. C. Vorsselman De Heer.—*By Professor Moll.*

Memoirs on the Nervous System. By Marshall Hall, M. D., F. R. S. L. & E.—*By the Author.*

Recherches Experimentales sur les Propriétés et les Fonctions du Systeme Nerveux dans les Animaux Vertébrés. Par P. Flourens.

Experiences sur le Systeme Nerveux. Par P. Flourens.

Nouvelles Experiences sur le Systeme Nerveux. Par P. Flourens.

Eloge Historique de G. Cuvier. Par M. Flourens.

Eloge Historique de Jean Antoine Chaptal. Par M. Flourens.

Eloges Historiques de R. Louiche Desfontaines et de J. Jul. De Labillardiere. Par M. Flourens. *By the Author.*

Report of the Sixth Meeting of the British Association for the Advancement of Science, held at Bristol in August 1836.—*By the British Association.*

The American Almanac and Repository of Useful Knowledge for the Year 1838.—*By the American Phil. Society.*

Report by a Committee of the Society of Arts in Scotland, on the best Alphabet and Method of Printing for the use of the Blind, 1837.—*By the Society of Arts for Scotland.*

On the Elements of the Orbit of Halley's Comet at its appearance in the years 1835 and 1836. By Lieut. W. S. Stratford, R. N.—*By the Author.*

Taylor's Calendar of the Meetings of the Scientific Bodies of London for 1837-8.—*By Lieut. W. S. Stratford, R. N.*

Bulletin de la Societé d'Encouragement pour l'Industrie Nationale. Pour Oct., Nov., Dec. 1835, et Jan. au Decembre 1836.—*Par la Societé.*

A Dissertation on the Causes and Effects of Disease considered in reference to the Moral Constitution of Man. By Henry Clark Barlow, M. D.—*By the Author.*

Constitution and Regulations of the Glasgow and Clydesdale Statistical Society, instituted April 1836.—*By the Society.*

Maps of the Ordnance Survey of Great Britain, No. lix.—*By the Board of Ordnance.*

Monday, 18*th December*.

Dr HOPE, V. P. in the Chair.

The following Communications were read:

1. Remarks on the Ossiferous Caves of Cefn, in Denbighshire. By Professor Traill.

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These caves, which were first described by the present Bishop of Norwich in 1832, and have since been more fully explored by Dr Cumming of Denbigh, were visited by the author in the autumn of 1837. The principal cave is a fissure in a grand mural escarpment of the mountain limestone of Wales, about two miles and a-half south-west of St Asaph, and occurs half-way down the precipice, which seems to be about 250 feet in height. It forms at that point the southern boundary of the limestone, which constitutes the basis of the Vale of Clwyd; and is divided from the extensive greywacke slate formation of that county by the narrow picturesque Vale of Cyffredin, through which the river Elwy flows.

The hill of Cefn consists of parallel beds of limestone, which the extensive quarries on its southern flank shew to have a regular dip of about 8°. This cave was discovered in 1830 to contain earthy deposits exceedingly rich in bones of mammifera; and, since that period, they have been much employed as a manure by Mr Lloyd, the proprietor. During the excavations for this purpose, many teeth and fragments of larger bones, so entire as to be readily recognised, have been obtained. An interesting collection of them is preserved at Cefn House, and some are in the hands of the author. Among the former, he noticed part of the humerus and a molar tooth of a rhinoceros, several teeth and bones of the hyæna, and beautiful teeth, and a considerable portion of the lower jaw, of a bear. Dr Traill has in his possession two phalanges and two teeth of a bear; a phalanx of a large Felis, resembling the tiger; parts of the tibia, and of the astragalus, and a phalanx of a large Bos; portions of the metacarpus of an immense ruminant, apparently a deer; besides a variety of fragments, not so easily ascertained on account of their mutilated state.

The materials, which filled up the fissure or principal cave almost to its roof, are regularly stratified. They formed together a mass of earthy matter twelve feet in thickness. The first or upper bed consists of layers of clay and very fine sand, two feet thick. The second bed is of plastic clay-marl, containing many small water-worn pebbles, chiefly of clay-slate, two feet thick. The third is a stratum so filled with broken and comminuted bones, as apparently to consist entirely of that material, two feet thick. It is in this bed that all the bones mentioned, except those of the bears, are found. Immediately below is the fourth bed, consisting of plastic marl-clay, with many water-worn pebbles of slate and compact felspar, with angular pieces of limestone; this is also two feet thick. The fifth bed consists of fine sand, which seldom contains any pebbles. It rests on the floor of the cavern, and has usually a depth of four feet. In one part of the cave, however, Dr Cumming detected below this bed a floor of hard stalagmite, about sixteen feet square; and on breaking it up, bones of bears were found mingled with sand and large water-worn pebbles of the rocks already mentioned.

One of the most interesting observations which occurred to the author during his investigation was, that the stratified earthy materials filling the cave were *not deposited horizontally, but had an evident dip*, which he remarked was in the same direction and apparent inclination as that of the limestone rock itself. The important inference he drew from this is, that the stratified materials were deposited in the cave before the limestone received its present position; and he conjectured, that the animals whose remains are here preserved may have existed even before the last great disturbances of our carboniferous system of rocks. Should similar phenomena be observed in other caves, it would perhaps carry back the existence of mammiferous animals to geological epochs more ancient than generally supposed; and account for the occurrence of diluvial materials in similar situations, without the startling supposition of extensive degradations of solid rocks, by causes apparently inadequate to produce them.

Another cave exists in the same neighbourhood, in which bones have also been found. It is near the village of Pont Newydd. In its bottom was found a collection of hyæna bones, in a mass of calc-sinter and gravel, four feet in thickness.

The author illustrated his paper by a view of the Cliffs of Cefn, and by a plan and sections of the principal cave.

2. Experiments on the Growth of the Fry of the Salmon, from the exclusion of the Ova to the age of seven months. By Mr John Shaw.

The author of this paper had formerly made experiments on the growth of the salmon fry, by procuring spawn from the river bed where it had been deposited by the salmon. Not considering these experiments, however, as entirely unobjectionable, he procured two fishes from the river Nith in the act of spawning; and having expressed the ova of the female in a convenient place, the milt of the male fish was made to impregnate them as nearly as possible in imitation of the natural process. The ova were then placed in ponds prepared for the purpose, and so arranged as to exclude all chances of error as to the species, or the nature of the progeny. The ponds were two in number;—one twenty-five by eighteen feet,—the other fifty by thirty feet, and two feet deep. The bottom was thickly imbedded with gravel, and a small stream of spring-water entered the ponds at the upper corner, and escaped by openings at the other end. Both apertures were covered with a wire grating. The ova in one experiment were deposited on the 20th of January 1837. On the 10th of March (fifty days after deposition), the embryo fish were visible. On the 27th of April (ninety-eight days after deposition), they were excluded from the egg. Specimens were exhibited at thirty days old, taken on 26th May, measuring nearly an inch in length, and the ovum still adherent. On the 27th June, at two months old, the fry measured an inch and a half in length; and on the 27th of October, at six months old, a specimen exhibited measured about four inches in length. The temperature of the pond and the air was noted at the periods of examination. Another experiment in a different pond afforded analogous results. Mr Shaw is of opinion, from what he has observed in these and former experiments, that the young salmon remains in its native stream for two years after being hatched; and that the parr, or what is termed the parr in his neighbourhood, is the young of the salmon.

The following Donations were presented:

Comptes Rendus Hebdomadaires des Séances de l'Academie des Sciences, (1837 2^me^ Semestre), Nos. 20, 21, 22.—*By the Academy.*

Journal of the Asiatic Society of Bengal for March 1837.—*By the Society.*

Scientific Memoirs, selected from the Transactions of Foreign Academies of Science and Learned Societies, and from Foreign Journals. Edited by Richard Taylor, F. S. A. &c. vol. i. —*By the Editor.*

A Synopsis of Chronology from the era of Creation, according to the Septuagint, to the year 1837. By William Cuninghame, Esq.—*By the Author.*

Monday, 1*st January* 1838.

Dr ABERCROMBIE, V. P. in the Chair.

The following Communication was read:

On the Terrestrial Mechanism of the Tides. By John Scott Russell, Esq.

Under the title Terrestrial Mechanism of the Tides, the author of this paper means to include the consideration of those causes which regulate the propagation of the tides, so as to exclude entirely the examination of the mechanism by which they are primarily produced. The generation of the tidal elevation in the Pacific or Atlantic Ocean is a question entirely of celestial mechanics. But the tides, after having been generated by solar and lunar attraction in a manner that is found to be perfectly in accordance with the varying intensities of these forces, do not subside at the instant when these forces cease to act, but continue to exist during a long period of time, reaching our shores three days after their birth; and have obeyed, during this long interval, laws perfectly independent of the original influence by which they were produced, and presented phenomena in direct opposition to it. They have obeyed the laws of terrestrial hydrodynamics. The law of the propagation of the tidal wave through the ocean and around our shores, belongs therefore to terrestrial, not to celestial mechanics.

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Although our knowledge of the celestial mechanism of the tides has recently attained a high degree of accuracy, our knowledge of the terrestrial mechanism has been hitherto almost entirely conjectural. In the former department, the system of Bernouilli, based on the discoveries of Sir Isaac Newton, presents us with a theory of the tides in close accordance with the phenomena. Laplace, in his elaborate discussion of the tides of Brest, executed by M. Bonnard, has verified this accordance to a high degree of precision ; and the recent researches on the tides, by Mr Lubbock and Mr Whewell, may be considered as having rendered the celestial mechanics of the tide as perfect as any other department of Astronomy, the errors of prediction being now reduced within the limits of the errors of observation ; so that Mr Lubbock has stated that he does not look forward to any material improvement in this department of our knowledge.

But our acquaintance with the terrestrial mechanism of the tides is in a very different condition. In reference to the phenomena of this department, Laplace has said, in the third chapter of the fourth book of the Mecanique Celeste, and he repeats the opinion in the first chapter of the thirteenth book, at a much later date, where he says : " Que les circonstances accessoires produisent des variétés considerables dans les hauteurs et dans les heures des marées des ports même très rapprochés ;" and then he adds, " Il est impossible de soumettre au calcul ces variétés, parceque les circonstances dont elles dependent, ne sont connues." Mr Lubbock, in like manner, speaking of the fluctuation of the establishment, says, " This perplexing fluctuation presents an insuperable obstacle to extreme accuracy in tide predictions, until it can be explained ; at present we are only left to conjecture respecting the cause." And Mr Whewell says, in 1837, " I cannot conclude this paper without again pointing out that a great number of curious facts in fluid motion are established in these Tide Researches, of which it may be hoped the theory of hydrodynamics will one day be able to render a reason."

In 1834, the author of this paper had determined the law of the interference of a certain species of wave in the resistance of fluids, and this species of wave appeared to present very striking analogies to the tide-wave. In 1835, Mr Whewell expressed his decided conviction of their similarity, and Mr Robison and Mr Russell were, in 1836, appointed a Committee of the British Association to investigate the subject. The Report of these observations was given to the British Association in 1837 ; but as the observations themselves are not necessarily connected with the particular conclusions which may be drawn from them, these conclusions, at which the author had arrived, were made the subject of a separate paper to this Society.

The paper embraced three subjects of examination.

I. *Regarding the true nature of the tide wave.*—By observations made on the tides of the rivers Dee (in Cheshire) and Clyde, it was ascertained that the tidal elevation is a large compound wave consisting of a series of elements, each of which is identical with the wave of the first order, or great primary wave of translation, of which the author had already determined the nature and the laws. The *velocity* of the tide-wave is that due to the depth of the centre of gravity of the transverse section of the channel below the surface. The tide wave is a wave of translation, but the velocity of translation of the particles is entirely different from the velocity of propagation of the wave, the former being variable, and the latter constant. When the velocity of propagation is greatest, the velocity of translation is often least. The translation takes place almost uniformly to the greatest depth hitherto observed.

II. *The application of our knowledge to the explanation of the ordinary and extraordinary observed phenomena of the tide.*—The identity of the tide-wave with the wave of translation affords an explanation of the following phenomena, which have hitherto been wholly unexplained or imperfectly understood. (1.) The dislocation of the tide by which the time of ebb is increased, and the time of flood diminished by propagation, after a considerable space. (2.) The difference between the height of tides in places which are adjacent, and have been expected to have nearly the same tides. (3.) The variation of the establishment from time to time, arising from changes in the dimensions and form of the bottom of the sea or channels of rivers. (4.) The cause of the breaking surge or tide-bar. (5.) The variation in the form of the curve of semi-menstrual inequality in the height and in the interval at different places, and the exaggeration of the other inequalities.

III. *The deduction of practical maxims for the improvement of tidal channels.*—The last part of the paper is directed to the determination of the principles by which tidal channels may be improved, so as to facilitate the ascent of the tide,—to increase its volume,—to diminish the duration of ebb, and increase that of flood-tide,—and to impede the action of the tide in moving sand, producing bars, and injuring the banks of tidal channels or rivers.